charts. The author considers it most important that the exact observational work at sea commenced under the auspices of the Carnegie Institution should be extended as soon as possible to all seas. He advocates international cooperation to ensure continuity in the drawings of magnetic lines in frontier districts, and emphasises the importance of adequate determinations of secular change.

The terminology, units, &c., employed in the description of the charts are explained in pp. 30–31. The charts themselves are divided into those dealing with the whole or the greater part of the earth, those confined to the oceans, those dealing with the several continents, and, finally, those devoted to individual countries or districts. The information given usually includes the area, the epoch, the magnetic element or elements dealt with, the interval—in specified units—between the successive isogonal, isoclinal, or isomagnetic lines, the geographical scale of the map, also the locus and date of publication. The title in each case, when there is one, is given in the original language. There is a separate list on pp. 60–61 of charts based on theory.

The list of charts seems very complete. As evidence that it is up to date may be mentioned the fact that it includes the British and American world charts published respectively in 1906 and 1907, Commander Chetwynd's charts of the South Polar regions published in 1908, Dr. Schmidt's charts of North Germany, and Prof. Beattie's South African charts published in 1909. The volume is clearly printed in good-sized type, and should prove a valuable work of reference.

C. CHREE.

ELECTRICAL BIOGRAPHY.

Makers of Electricity. By Brother Potamian and Prof. James J. Walsh. Pp. vi+404. (New York: Fordham University Press, 1909.)

THIS is not a work on central-station engineers, but a series of biographical sketches of the chief pioneers in the science of electricity in its historical development. Of these sketches there are twelve, as follows:—Peregrinus and Columbus; Norman and Gilbert; Franklin and some of his contemporaries; Galvani; Volta; Coulomb; Oersted; Ampère; Ohm; Faraday; Clerk Maxwell; Lord Kelvin. As the first three, together with those on Oersted and Lord Kelvin, are signed by Brother Potamian, it may be assumed that the rest are by his colleague, Dr. Walsh, who is the author of several others works, "Makers of Modern Science," "Catholic Churchmen in Science," "Makers of Modern Medicine," and "The Popes and Science," which appear to have a great vogue amongst Roman Catholic readers in the United States. Brother Potamian, better known to his English friends as Dr. O'Reilly, is one of those who has made the bibliographical history of electricity his own; and his masterly annotations of the catalogue of the Wheeler collection of electrical books (formerly the library of the late Mr. Latimer Clark) in the possession of the American Institute of Electrical Engineers show him to possess abundant qualifications for writing biographies of the pioneers. If the chapters on Peregrinus and Columbus, Norman and Gilbert, add nothing to previous knowledge, they are valuable in presenting very readable summaries of the results of recent antiquarian research into the achievements of these early investigators of magnetism. The account of Peregrinus is particularly good, and avoids errors too often attaching to accounts of his long-forgotten discoveries. The article on Gilbert is also replete with the details which have been unearthed in recent years, though by a slip on p. 49 he is said to have blamed Stevinus for certain "vain and absurd" views about the variation of the compass in southern regions of the earth. It was not Stevinus whom he blamed, but "certain unnamed Portuguese mariners." Gilbert's Copernican views are discussed fully, and criticised.

Franklin's work in electrical observation is treated at some length, as is natural in a work intended primarily for American readers; but all readers should be grateful for the very clear way in which Brother Potamian has laid out the historical position of Franklin with respect to those contemporaries of his—De Romas, d'Alibard, and Divisch—who have been alleged to have anticipated him with respect either to the kite experiment or the invention of the lightning rod. One amusing reminiscence is recorded in this chapter of the controversy which arose upon knobs *versus* points, and was referred to a committee of the Royal Society. In that committee the Hon. Henry Cavendish and Dr. Benjamin Wilson were opposing partisans. Sir John Pringle, the President of the Royal Society, supported Cavendish in favour of using points. But points had been advocated by Franklin, whom to support at that moment was "unpatriotic." His Majesty George III. accordingly ordered that the points of the lightning conductors at Kew Palace should be replaced by balls; whereupon Sir John Pringle, replying with dignity, "Sire, I cannot reverse the laws and operations of nature," resigned the presidency. This evoked the following witty epigram:—

> While you, great George, for knowledge hunt,
> And sharp conductors change to blunt,
> The nation's out of joint;
> Franklin a wiser course pursues,
> And all your thunder useless views
> By keeping to the point.

The chapters devoted to Galvani and to Volta call for little comment. That on Coulomb gives a better biography than is accessible in English elsewhere. Those on Oersted, Ampère and Ohm are each good in their way; but that on Ohm lacks proportion. One might think that the whole of mathematical physics began and ended with Ohm's "Law."

The lives of Faraday, Clerk Maxwell, and Lord Kelvin are compiled with a knowledge and sympathetic comprehension. The one phrase to which one must take exception in the account of Lord Kelvin is the suggestion—*apropos* of Lord Kelvin's saying at his jubilee that the most strenuous of his efforts for the advancement of science had ended in "failure"—that "because Dame Nature did not open to his

sesame, but persisted in her reticence, the philosopher grew pessimistic and disappointed." "Pessimistic" is the very last adjective to be applied to Lord Kelvin in his cheery and undaunted battling to the last with the deepest problem of mathematical physics. No trace of disappointment soured the serene close of his strenuous life.

There are eight portraits and a score of illustrative cuts in the work, which is well and clearly printed.

OUR BOOK SHELF.

Syllabus of the Lessons on Marine Biology for Fishermen, given at the Marine Laboratory, Piel, Barrow-in-Furness, by the Lancashire and Western Sea-Fisheries Joint Committee. Revised January, 1910. Pp. 35; 7 plates. (Liverpool: C. Tinling and Co., Ltd., 1910.)

THIS handbook, which has been prepared by Mr. James Johnstone, is written in a clear, direct style, and is illustrated by good text-figures and seven excellent plates. The author is to be especially congratulated on the skill with which he has, throughout the book, avoided the use of technical terms without sacrificing scientific accuracy. The desire to avoid the use of the word protoplasm has, however, led to the use of another term in an unusual sense; on p. 13 the author, dealing with Peridinians, writes:—"They, like the diatoms, are jelly-fish, and have shells . . . ." It would be better to avoid the use of the term jelly-fish, in such a connection, in view of its more generally accepted application to organisms of a higher class.

The book contains outlines of lessons on those branches of marine biology which are of special interest to fishermen—the general anatomy, physiology and development of the mussel, the structure of the cockle, the food of these molluscs; the structure of shrimps, crabs and lobsters, their growth, "casting" (ecdysis) and reproduction; the anatomy of the haddock or whiting, the fecundity of various fishes, especially of flat fishes, that of the flounder being studied in detail; the food in the sea, plankton; the different kinds of spawn found on the shore; the elementary chemistry of air and water, the temperature of the sea, &c. This list will serve to show the range of subjects comprised in this admirably planned course of scientific instruction. The book is certain to stimulate the interest, not only of those who attend the classes, but also of other fishermen, to whose notice it will be brought by their more fortunate fellow-workers who have passed through the classes and used the book.

The Sun a Habitable Body like the Earth. By Sree Benoybhushan Raha Dass. Pp. xiv+130. (Naldha: Published by the Author, 1909.) Price 5*s*., or 3 rupees.

THIS is, typically, a book "published (and distributed) by the author," and perhaps the kindest statement to make about it is that it is an anachronism. Apparently the author attempts to explain all solar phenomena as electrical effects, and, as a prelude, describes the actions of, and discharges from, insulated conductors; but the language is so often obscure, and, where intelligible, is so devoid of connected reasoning, that no clear idea can be obtained as to the ultimate conclusions. Quotations from great authorities, including Herschel's conclusion as to the sun's habitability, give the volume itself an air of authority which is rudely dispelled on a closer acquaintance.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

The "Reindeer" from the Lorthet Grotto.

I HAVE just been consulting in *Science Progress* for July, 1909, the very interesting paper of Prof. Sollas on the Palæolithic races, and I venture to direct attention to the title of an illustration on p. 25. It is entitled "Reindeer and Salmon Incised on a Piece of Horn from Lorthet." This legend is taken from the original figure by the late M. Piette in *L'Anthropologie*, 1904, p. 160; but is the Cervus there engraved rightly ascribed to *tarandus?* Is it not *megaceros? Tarandus* has no brow tines like those delineated on this horn plaque. They are more or less palmated, while in *megaceros* they are differently directed, present a different section, and are bifid as are those figured in *Science Progress*. It may or may not be now or later of importance to ascribe correctly this particular drawing, but the determination of the species in prehistoric cave-engravings has an important bearing on the age and climate of the horizon from which they come.

May I venture, if Prof. Sollas will allow me, to refer also to p. 26 of the same important contribution, where occur the words ". . . Saiga antelope, the same animal as that which is sculptured in so masterly a manner on the spear-thrower mentioned on p. 20 (Fig. 3)." The animal sculptured—also after M. Piette's figure in *L'Anthropologie*—on the implement (from Mas d'Azil) referred to can hardly be a *Saiga*. The position and form of the nostrils and the uninflated nose-sac which the side-view reveals preclude this determination. The creature must be a goat or a chamois, or belong to a nearly related genus. HENRY O. FORBES.

The Museums, Liverpool, March 20.

Centre of Gravity of Annual Rainfall.

THE ordinary method of exhibiting the annual distribution of rainfall for any station or country is a graph the ordinates of which represent the monthly rainfall. Though this pictorial method is both useful and interesting, it does not lend itself to the ready comparison of a number of such graphs for different places or for the same place in different years. By a similar graphic method we can exhibit the yearly rainfall totals for a number of years, but we cannot show differences of internal distribution for each year unless we are at the trouble to graph each month of each year separately.

Another method, which may be called the analytical method, I have been applying recently to the study of the rainfall of the province of Mysore, India, upon which I had to report officially from 1893 to 1908, and I have been much surprised at the results brought out by this method. The same method applied to the rainfall statistics of England, Scotland, and Ireland, as given by Dr. H. R. Mill in "British Rainfall" for 1908, shows also curious and interesting results.

The method consists in the application of the well-known formula for finding the position of the centre of gravity of a number of weights placed along a straight rod, viz. $X = \Sigma(wx) \div \Sigma(w)$. If we imagine the rainfall for the months of the year January, February, . . ., December to be weights placed along an axis at distances 1, 2 . . . 12 units from the Origin, or end of the axis (January 1), multiply each month's rainfall by its distance from the Origin, and divide the sum of the products by the total rainfall for the year, we get the position (or date) at which the year's rainfall might be supposed to have fallen all together to give the same effect as the separate monthly falls.

The Mysore Province, which has about the same area as Scotland without the Isles (28,000 square miles), is divided into eight *Districts*, which differ greatly in the amount of yearly rainfall, as well as in the monthly distribution. Each *District* is divided into a number of